EDUCATORS' SYMPOSIUM

On Natural and Cultural Resources of Southern Marin, GGNRA

OCTOBER 1, 2003

Welcome

To each of you who utilize this very special national park as a living classroom, welcome. We appreciate your interest in learning more about research in the northern lands of the park. You are a conduit to the students and visitors you teach. We hope the information you gather here will help you to enrich your programs and to inspire your students to seek careers in science, research, or stewardship—or, at the very least, to continue their connection and commitment to the GGNRA.

You will not hear in the few hours we have today about all the wonderful restoration and stewardship programs in the park. That is for a longer meeting. Today you will learn of front-line research being conducted north of the Golden Gate, which will guide future approaches to restoration in this park.

We especially want to thank all of the presenters for taking time from their busy schedules to prepare and bring their important information to us. All who are here appreciate your ongoing research efforts and your willingness to share that information (presenter biographies follow the "summaries of talks" section). As a courtesy to the speakers, please turn off your cellphone.

This symposium promotes sustaining the park by being sustainable in our use of resources. Dinner will be no-waste. The proceedings are printed on both sides of recycled paper. We ask that you take a copy of the proceedings if you will use it in your work, otherwise, we ask that you share with a neighbor. Extra copies will be made for those who could not attend. During the dinner hour or after the presentations, check out the posters in the Cypress Room. They have information about other projects and research in the park. Hot chocolate will be available in the Cypress Room after the presentations.

The proceedings will be available online at http://www.nps.gov/muwo/research. Videotapes of the presentations will be available for checkout at the Marin Headlands (331-1540) and Muir Woods (388-2596) visitor centers. Planning for this event has been a partnership of the Golden Gate National Recreation Area interpretive staff, Headlands Institute, and the Golden Gate National Parks Conservancy. We especially want to thank the Headlands Institute for hosting the symposium and preparing the dinner. Duffy Ross from HI did a wonderful job of logistical organization. Joanne Jarvis of the GGNRA arranged for the great speakers and logistics connected with their presentations. Vivian Young, Golden Gate National Parks Conservancy graphic designer and artist, produced the record of the proceedings in her usual beautiful way. Mia Monroe, Interpretive Operations Supervisor, Marin GGNRA, and Betty Young, Golden Gate National Parks Conservancy Native Plant Nursery Coordinator, guided our planning and suggested many of these excellent presenters.

Beyond Books: Partnering to Bring Bird Conservation Science to Bay Area Schools

RESEARCH ABSTRACT OF

Sue Abbott – PRBO Conservation Science

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Engaging students' attention is one of an educator's biggest challenges. As they face greater-than-ever expectations and accountability, teachers need our support. To ensure that conservation and stewardship are integral components of our educational system, PRBO Conservation Science (formerly Point Reyes Bird Observatory) and its partners work closely with a network of Bay Area teachers through the STRAW project.

STRAW, a project of The Bay Institute and The Center for Ecoliteracy, coordinates and sustains a network of teachers, students, community members, and restoration specialists as they plan and implement riparian studies and restoration projects in Marin and Sonoma counties. STRAW provides teachers and students with scientific, educational, and technical resources to prepare them for outdoor, hands-on watershed studies, including ecological restoration of riparian corridors. STRAW's overarching goals are to:

- empower students,
- support teachers,
- restore the environment, and
- reconnect communities.

PRBO has been providing bird education programs and educational resources to STRAW staff, teachers, and students since 1999, matching STRAW programs to their needs. We do this in a variety of ways:

- Hosting groups at our Palomarin Field Station and three other National Park Service riparian (streamside) sites in Marin County and providing students with an opportunity to observe and learn about local bird ecology and research through mist-netting demonstrations.
- Leading in-class, teacher-tailored, bird education workshops on regional bird conservation and ecology topics.
- Leading field trips to local parks, wetlands, and creeks to observe birds.
- Participating in class projects and creek restorations.
- Training teachers in bird research methods and bird identification.
- Providing teaching tools and bird activities for the classroom.

For more information about PRBO's education programs, please visit our Conservation Education pages at *www.prbo.org*. To learn how to become a STRAW partner or school, please visit *http://www.bay.org/educate/straw.html*.

An Overview of Marine and Coastal Research at Point Reyes National Seashore and GGNRA

RESEARCH ABSTRACT OF

Ben Becker – Pacific Coast Science and Learning Center

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I will discuss current marine and coastal research, conservation, and education projects coordinated by the Pacific Coast Science and Learning Center at Point Reyes National Seashore. Highlighted projects will include the Tomales Bay Biodiversity Inventory, coastal seafloor mapping, and the design of potential marine protected areas along the Marin coast.

Sediment Dynamics in San Francisco Bay Salt Marshes

RESEARCH SUMMARY OF

John Callaway – Dept. of Environmental Science, University of San Francisco
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There is growing interest in the restoration and management of salt marshes in San Francisco Bay. Restoration is of particular interest, given the loss of over 90% of the bay's historic salt marsh acreage. A significant issue for the long-term sustainability of salt marshes is their elevation relative to sea level, and sediment dynamics are critical factors that affect the relative elevation of salt marshes.

My research has evaluated sediment dynamics at two natural salt marshes (Greco Island and the mouth of the Coyote Creek in south San Francisco Bay) and one restored salt marsh (Crissy Field in GGNRA). I am measuring both the accretion of sediment on the marsh surface, as well as the resulting change in marsh surface elevation. Short-term sediment accretion rates were measured using feldspar marker horizons, while sedimentation-erosion tables (SETs) were used to measure changes in the relative elevation of the marsh surface. These methods have been used at salt marshes and other coastal wetlands around the world.

At each location, three replicate transects have been established to measure both accretion and relative elevation, with stations in low-marsh, mid-marsh, and high-marsh areas. Multiple stations will allow for an evaluation of any trends in sediment dynamics across the marsh. Stations were established in summer and fall 2000, and monitoring continues on an annual basis. Rates of sediment accretion at most sampling stations ranged from 2 to 5 mm/yr at both natural marshes (this is within the range of rates found in most other coastal wetlands). However, at the low-marsh sites along Coyote Creek accretion rates were up to 20 mm/yr, likely due to high rates of local sediment inputs. Whereas most locations at Greco Island were stable in terms of changes in relative elevation, shallow compaction substantially affected the relative elevation of the marsh at Coyote Creek, with most sampling locations showing a reduction in relative elevation.

At Crissy Field, both accretion rates and changes in relative elevation were highly variable, with no consistent trends across the marsh. Although sedimentation rates in subtidal areas within Crissy Field have been reported to be high, accretion rates on the marsh surface were relatively low, averaging less than 1 cm per year. Over the last two years, low-marsh sites at Crissy Field have experienced erosion rather than sediment accumulation, likely due to resuspension of sediments by strong local winds. Shallow compaction of wetland sediments could have substantial implications for the planned restoration of salt marshes in San Francisco Bay, including salt ponds in both the north and south bay.

Recreational Values of Community-based Stewardship in the GGNRA

RESEARCH SUMMARY OF
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Many urban park managers are dependent upon community volunteers. Yet few park managers have examined the recreational value that such stewardship activities provide to the community and volunteer as a whole. Prior research (Henderson 1981) suggests that volunteerism is perceived as a leisure experience by some volunteers. However, there is no research that examines a volunteer's experience (as a leisure experience) within either environmental programs or an environmental setting. A study was administered in the Golden Gate National Recreation Area (GGNRA) to examine the recreational values of natural resource-based volunteer stewardship.

A survey instrument was designed to gather demographic and program participation information, information about perceptions of volunteering as a recreational experience, motivations for volunteering, leisure characteristics experienced during volunteer programs, and thoughts regarding the future for community stewardship programs. The four-page survey was administered to 445 park stewards. Surveys were both mailed to volunteers and administered in the field during habitat restoration programs. Volunteers from more than eight park stewardship programs participated in the survey. Thirty volunteers, randomly selected from the survey participants, were also selected to participate in a more detailed survey and participate in one-on-one interviews.

Approximately 85% of the survey respondents believed that community-based stewardship is a recreational experience. This response was further substantiated through comments provided during interviews and written responses to more detailed survey questions. In addition, respondents ranked "volunteer stewardship provides a recreational experience" second when identifying reasons for the perceived increase in participation in community-based stewardship programs. Eighty-three percent of those surveyed also noted that community-based stewardship provided them with a recreational experience when asked to define characteristics associated with their personal volunteer experience.

There were significant differences in the demographic characteristics of volunteers identifying "recreational" as a quality associated with their stewardship experience, with only 67.7% of the 45- to 54-year-old group responding positively, compared to 92.5% of the 18- to 24-year-old group. Education also had a strong influence, with respondents who had completed some college representing the highest percentage (87.2%) of respondents selecting recreation as a characteristic of their leisure experience.

In addition, 93.7% of the respondents indicated that community-based stewardship programs should be integrated into recreation and leisure services. This number was surprisingly higher than expected, given the natural resource management focus of community-based stewardship programs within the park. If community-based stewardship programs were explicitly integrated into the recreational services provided by the GGNRA, it could further bridge the park's goals of natural resources and visitor services management.

The results of the study also indicated that respondents were primarily motivated to participate in stewardship for conservation and protection-based reasons, and volunteers highly valued social- and education-based recreational qualities they associated with their experiences. Five leisure measurements and eight motivational measurements were analyzed within respondents' demographic and program affiliation characteristics.

The second section of this study compared the demographic characteristics of traditional park recreationists and volunteer stewards to determine if there were any trends within the differences and similarities of respondents' socio-demographic variables between the two groups. The demographic data for the traditional park user was ascertained from a previous study conducted within the GGNRA in 1996 by the Golden Gate National Parks Association (GGNPA). While statistical tests were not run on the data sets, observable trends were noted. Community-based stewardship programs introduced younger populations into the park. Approximately one-third (33.4%) of the stewardship respondents were under 24 years old, versus less than 10% of the randomly selected park users. In comparison, more than twice as many randomly selected park users (18.1%) were between the ages of 45 and 54. The ethnic composition of both the surveys' respondents were similar, except that the randomly selected user-group included a higher percentage (9.4%) of African American respondents, in contrast to 2.8% of the community-based stewardship respondents. In addition, Asian Americans were better represented (16.1%) in the community-based stewardship programs than in the randomly selected user survey (6.3%). This data indicates that community stewardship programs provide a gateway for several under-represented populations to experience the GGNRA.

Two Decades of Community-Based Raptor Monitoring at the Golden Gate

RESEARCH SUMMARY OF
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GGNRA ecologist Judd Howell started the Golden Gate Raptor Observatory as the GGNRA Raptor Banding Program in 1983. Although the hawk migration over the Golden Gate had been known about since 1972, no one had attempted to trap and band the migrant raptors to see where they were flying. With critical support from the San Francisco Zoological Society and local falconer Will Shor, Howell attracted more than 100 volunteers to the banding program by 1984, and set up the basic structure of the GGRO volunteer system that we still use today.

Today, more than 250 volunteers contribute roughly 40,000 hours annually to a variety of GGRO activities, most of which are focused on monitoring the autumn migration: hawk counting, banding, and radio-tracking, and public "HawkTalks." Volunteers also contribute throughout the year to other GGRO projects: the Bay Area Raptor Nesting Survey, the Cooper's Hawk Intenstive Nest Survey, Baskets for Birds, and local nest surveys. A variety of professional areas—including computer systems, Website management, graphic design, photography, taxidermy, public relations, curriculum development—also receive intensive volunteer attention. This year (2003) marks the twentieth year of service for several volunteers.

Since 1986, the support of nearly 50 full-time seasonal interns has been enlisted, and many of these individuals have gone on to become professional wildlife biologists, professors, NGO directors, artists, writers, environmental educators, animal handlers, teachers, and veterinarians, just to name a few.

Today, the GGRO has three full-time staff members and continues to be a cooperative program of the Parks Conservancy and the National Park Service. We have banded more than 19,000 hawks since 1983, including more than 900 on our innovative RoboLure system. From this sample we have received band recoveries on around 550 raptors, mostly Red-tailed, Cooper's, and Sharp-shinned hawks, documenting flights from as far north as coastal British Columbia to as far south as central Mexico. We have counted from 15,000 to 36,000 raptor-sightings each season since 1986. In 1989, we began using a site-specific method, the Quadrant System, also developed here by volunteers. Finally, we have tracked 37 raptors of five species using radiotelemetry since 1990. This technique has allowed us to focus on a hawk's daily survival strategies as well as its sometimes bizarre interactions with humans while on the road. Our tracks have led us as far north as Shasta, and as far south as Mexcali.

We share our data and results widely each winter, after migration season. We have particularly strong involvement with the Raptor Research Foundation, the US Geological Survey, the US Fish and WIldlife Service, and California Department of Fish and Game, among others. We also conduct specialized research, as opportunity permits, with local universities.

Bullfrog (*Rana catesbeiana*) and Non-Native Fish Control, 1997-1999

Tennessee and Oakwood Valleys, Marin Co., CA

RESEARCH SUMMARY OF
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With funding assistance from the U.S. Fish and Wildlife Service (Sacramento Field Office), the GGNRA initiated a three-year project in 1997 to improve habitat conditions for native aquatic wildlife, including the federally threatened California red-legged frog (*Rana aurora draytonii*). Control of introduced fish and bullfrogs within Oakwood and Tennesee Valleys, Marin Co., was considered a major component of this project.

The proposal involved three phases:

1) manual removal of metamorphosed bullfrogs, egg masses, and introduced fish,

2) seasonal draining to remove bullfrog tadpoles and introduced fish in Haypress, Back door, and Oakwood Valley Ponds in fall, and

3) aquatic trapping of bullfrog tadpoles, juveniles, and adults.

Fall eyeshine surveys were done to assess the effectiveness of project actions on bullfrogs. Results indicate that the three-year program had very little impact on the number of bullfrogs currently present within Haypress Pond.

Post-project bullfrog numbers at Haypress Pond were higher than pre-project estimates. Draining and manual control activities are not be sustainable actions, and based on past efforts, would not reduce the numbers of bullfrogs. Sustainable reductions in bullfrogs require physical modification to their habitat.

RESEARCH SUMMARY OF
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The pathogen that causes sudden oak death (SOD), *Phytophthora ramorum*, infects a diversity of plant species, including redwood, Douglas-fir, and rhododendron, in addition to oaks and tan oaks. Many wildlife species depend on oaks, madrones, and other susceptible plant species for their habitat and diet. The potential impact of SOD on wildlife is significant. WCS is collaborating with state, federal, private, and tribal agencies and landowners to study the ecology of the epidemic in order to understand its effects on wildlife in susceptible systems and reduce wildlife/human conflict.

The Human Aspect

Research shows that *P. ramorum* is transported by weather (e.g., wind-driven rain) and by human activities (e.g., vehicles, bikes, hiking). Landscape-scale resource management affects the susceptibility of landscapes to infection by *P. ramorum.*

Threats

WCS has documented an alarming difference of at least an order of magnitude in acorn production between an uninfected (400kg/ha) versus infected (4kg/ha) area in Big Sur, California. Cascading effects of reduced acorn production pose a significant threat to landscapes and wildlife from Monterey County, California, to southern Oregon.

WCS Activities

WCS is concentrating its efforts on the ecological consequences of the sudden oak death epidemic for native plants and animals. The goal of this research is to monitor vulnerable plant and wildlife populations, to predict likely areas and forms of resultant wildlife/human conflict, and to assemble the biological data essential to address the impact of *P. ramorum* on wildlife populations. Despite the enormous disturbance caused by introduced forest disease in North America, little research has been conducted to investigate the ecological disruption itself. WCS is committed to unraveling the ecology of this epidemic and assessing the impact of sudden oak death on wildlife.

Important Next Steps

- Assess the diversity and abundance of wildlife species that depend on susceptible plants for food, nest sites, and habitat in California ecosystems.
- Monitor the behavior of key seed-dispersers and pollinators in these sites.
- Assess disease and mortality resulting from sudden oak death and measure the impacts of these changes on native plant and wildlife populations.
- Determine patterns, extent, and prevalence of plant disease and mortality within affected sites.
- Analyze the relationship between resource management and the susceptibility of landscapes to forest disease.
- Collaborate with federal and state agencies, and public, private, and tribal landowners to explore management and restoration strategies in affected and susceptible ecosystems.

Warbling Vireo, Wilson's Warbler, and Swainson's Thrush: Stories of Research, Monitoring, and Management of Songbirds in Coastal California

RESEARCH SUMMARY OF

Thomas Gardali – PRBO Conservation Science

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PRBO Conservation Science (founded as the Point Reyes Bird Observatory in 1965) has been monitoring landbirds in the Point Reyes National Seashore and Golden Gate National Recreation Area from years to decades, depending on the site. In order to introduce landbird monitoring and research efforts in these coastal national parks, I will provide specific examples for three species, the Warbling Vireo *(Vireo gilvus)*, Wilson's Warbler *(Wilsonia pusilla)*, and Swainson's Thrush *(Catharus ustulatus)*. Each species-specific story will introduce methodologies, the types of results obtained, and management considerations.

Mist-netting is a method of capturing, banding, and releasing birds in a standardized fashion. Capture rates of Warbling Vireos from 1979 to 1997 at the Palomarin Field Station declined dramatically, indicating that their population could be in trouble. Alternatively, these "long-term" data may be just showing natural variation in Warbling Vireo abundance and may not be cause for concern.

Monitoring population trends provides information on ecosystem health and, importantly, highlights when action is needed to reverse declines. Nest monitoring involves spending many hours observing bird behavior in order to locate and monitor the progress of songbird nests during the breeding season (mid-March to mid-August). PRBO located and monitored Wilson's Warbler nests on Redwood and Lagunitas creeks and estimated how well these warblers were reproducing. Reproductive success is one critical component contributing to the health of a population, and measuring it aids in understanding whether populations can sustain themselves over time. Unfortunately, we discovered that reproductive success was extremely low at these sites, suggesting that these creeks may not provide high-quality breeding habitat for the Wilson's Warbler. A close look at the causes of nest failure can guide management actions and help Wilson's Warblers have a better future raising healthy young in the parks.

Radio telemetry was used to locate fledgling Swainson's Thrushes at Redwood and Lagunitas creeks. This method involves placing a tiny transmitter on a nestling and following its movements subsequent to leaving the nest. Young Swainson's Thrushes readily used habitats that differed from where they hatched (where adults breed). These results suggest that conservation of Swainson's Thrush breeding grounds—riparian (streamside) habitats—must also include adjacent upland habitats.

What's New with Nike

An Informal Update on Preservation and Interpretation Efforts at Nike Site SF-88L at Fort Barry

RESEARCH SUMMARY OF

Stephen A. Haller – Park Historian, Golden Gate National Recreation Area
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The intent of this informal verbal presentation will be to brief educators and other park partners who use the Nike Site in their programs about work planned and in progress, both physical work to restore and maintain the historic site, and interpretive programming to educate children and adults about the site and its larger meaning.

Preservation work planned consists of rehabilitation of the pathway to the Dog Kennels and making it accessible; repair of lighting, rebuilding of hydraulic systems at both missile pits, and never-ending rust abatement and painting.

The site's permanent Web address, *nikemissile.net* will soon be migrating to the National Park Service Website *www.nps.gov/goga*, and the park has placed *What We Have We Shall Defend*, a combined history and historic structure report on the Nike Site, on-line at *www.nps.gov/goga/nike/pdf/what_we_have_1.pdf*.

Last spring, the park instituted a curriculum-based program targeted to the tenth grade at the Nike Site. Entitled "Nuclear Reactions," this inquiry-driven program will be continued this coming spring, and may possibly be adaptable in part to the visits of the HI and YMCA.

Finally, the park will be working with Antenna Theater to develop an audio-tour system for the Nike Site similar to the very successful program on Alcatraz. We feel that this is a very exciting development, one that has potential to reach a much greater number of visitors with quality interpretation than our limited staff allows us to do at the present. We hope that our park partners will be interested in providing input as this process develops.

RESEARCH SUMMARY OF

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Like the tides, like the dawn, monarch butterflies return to the coast of California each winter from their breeding ranges throughout the western United States. Marin County is at the northern part of the overwintering range and hosts several significant climax roost sites. Several are in or border the GGNRA. Ongoing monitoring documents arrival, persistence throughout the winter, site use and site changes that may influence butterfly usage. Monitoring is also helping to develop an understanding of the necessary microclimate parameters for a site to be favorable for monarch overwintering. These include internal grove temperature, the value of a buffer zone to provide wind protection, nearby water and nectar sources, exposure to sunlight throughout the day, as well as the importance of ground cover.

We are also learning how the area's cultural heritage has helped shape the favorable conditions of these wintering sites through the planting of eucalyptus, as well as cypress and pine. Marin County sites are noted for the range of tree species used. Eucalyptus is now the most common roost tree at overwintering sites throughout California but in Marin County monarchs tend to favor Monterey Pine and Monterey Cypress when available. The controversial role of these three species in the natural world, in a park setting and at the urban interface yet today playing a key role at a critical point in the monarch butterfly's life cycle will be examined. Using a microclimate prescription and neighboring community resources can sites be protected while meeting other park objectives?

Beach Watch: A Shoreline Monitoring Program

RESEARCH SUMMARY OF

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Shoreline surveys for beached (dead) birds have been conducted since the middle of the twentieth century *(Bull and Boeson 1961, Veitch 1976, Page et al. 1982, Stenzel et al. 1988, Powlesland and Imber 1988, Carter and Page 1989, and Bayer 1991)*. In 1993, the Gulf of the Farallones National Marine Sanctuary (GFNMS) began Beach Watch, a long-term shoreline monitoring program. The objectives of the program are to:

1) provide baseline data on the number of live and beachcast marine organisms;

2) assist Sanctuary management in the early detection of natural and human-caused environmental perturbations such as an epizootic outbreak, El Niño—Southern Oscillation events, and oil spills;

3) develop a network of skilled shoreline surveyors to respond during oil spills;

4) educate the public about the coastal environment; and

5) encourage public stewardship of beaches within the Sanctuary.

These objectives are accomplished through systematic surveys of designated beaches to generate encounter rates for beached marine animals.

The initial concept of Beach Watch was developed from the beached bird survey program initiated by PRBO during the 1970s *(Stenzel et al. 1988 and Carter and Page 1989)*. They established a standard assessment procedure for seabirds in central California and were contracted by the GFNMS to write a post-spill assessment plan for birds within the GFNMS. The Carter and Page shoreline survey protocols were later modified for standardized year-round shoreline survey program that documents live and dead vertebrates found along the GFNMS shoreline.

This study reviews a subset of data collected by the Beach Watch shoreline survey program and presents the encounter rates (number per kilometer surveyed) for the presence of beached birds, presence or absence of oiling on each bird, the number of tarballs (small patties of weathered oil), and the location of beached birds and tarballs throughout the Gulf of the Farallones shoreline.

Developing Sanctuary Stewards through High School Sandy Beach Monitoring

RESEARCH SUMMARY OF
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High school students in the San Francisco Bay area monitor local coastal habitats to help the Gulf of the Farallones National Marine Sanctuary protect the resources of the marine environment. They monitor the population of Pacific mole crabs (*Emerita analoga*), or sand crabs, in collaboration with the Farallones Marine Sanctuary Association. These small crustaceans live in the swash zone of the sandy beach habitat and are important in the food web. We study the trends in distribution, gender, and size of sand crabs. The status of the population can help indicate the health of the larger environment. Acanthocephalans (thorny-head worms) are parasites that use sand crabs as their primary intermediate hosts. Surf Scoters (diving ducks) are the definitive host (parasite can reproduce) for acanthocephalans, but the parasite affects sea otters as well. Acanthocephalans have caused Surf Scoter die-offs and disease in sea otters by causing peritonitis (inflammation of the abdominal cavity).

In the Golden Gate National Recreation Area, students from eight schools monitor sand crabs at five beaches:

Fort Funston Beach	Thornton High School
Ocean Beach	Abraham Lincoln High School
	San Francisco University High School
	St. Ignatius College Preparatory
	California Academy of Sciences Interns
Baker Beach	George Washington High School
Muir Beach	Tamiscal High School
Stinson Beach	Marin Academy

Monitoring occurs in the spring, summer, and fall. Transects are set up perpendicular to the shoreline and 10 samples are collected along each transect. The carapace length is measured to the nearest millimeter. The gender of each crab, including the presence of eggs, is determined. All crabs are returned to the sand, except 10 to 30, which are dissected for parasite analysis in the classroom. Students enter their data in the online database (*www.sandcrab.org*) and analyze the results.

Trends examined include differences in the gender ratio, size frequency, and distribution along the beach seasonally and in comparison to other beaches. Students are able to better understand the processes and significance of the sandy beach habitat from this study. They increase their understanding of the natural sciences and the role of monitoring habitats in management of protected areas.

Marine Mammal Stranding: Response Network and Lessons Learned from the Animals

RESEARCH SUMMARY OF
Kathy Zagzebski – The Marine Mammal Center
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Marine mammals are important species in the marine ecosystem. Investigations into stranded marine mammals tell us a great deal about marine mammal populations and also about ocean health. Recognizing the importance of responding to marine mammal strandings, the federal government created the Marine Mammal Stranding Network. Managed by NOAA Fisheries and composed of nonprofit organizations, universities and scientific academies, and government agencies, the stranding network responds to live- and dead-stranded marine mammals. Goals of the program include: to facilitate collection and dissemination of data, to assess health trends in marine mammals, to correlate health with available data on physical, chemical, environmental, and biological parameters, and to coordinate effective responses to unusual mortality events.

The Marine Mammal Center is a member of the Stranding Network, responding to live-stranded marine mammals from the southern border of San Luis Obispo County through the northern border of Mendocino County, including the entire Golden Gate National Recreation Area (GGNRA) in Marin and San Francisco counties. We have a 24-hour rescue hotline (415.289.SEAL), and we also take calls about dead marine mammals and pass them along to the appropriate scientific organization. The Center responds to seals, sea lions, whales, dolphins, porpoises, sea otters, and sea turtles. Although strandings vary greatly from year to year, on average we admit 400-600 animals annually. Within the GGNRA, The Center rescues 24-105 animals per year. Our mission is to rescue animals that are injured, sick, or orphaned, rehabilitate them, and release healthy animals back into the wild. Over 50% of the animals rescued are successfully released back into the ocean. Another important component of our mission is research and scientific discovery, in order to learn more about marine mammal health. The third component of our mission is public education and outreach, in order to share what we learn with others.

Causes of stranding in marine mammals are many and varied. Some strand due to injuries caused by predators, some strand because of congenital defects. Some strand due to viruses such as herpes virus, or bacterial infections such as leptospirosis. Many have parasites that contribute to stranding, such as lungworm. Animals may strand from environmental causes, such as poisoning from a neurotoxin called domoic acid caused by a harmful algae bloom. Animals also strand because of direct human interactions such as gunshot, entanglement, boat strikes, and illegal pickups. Understanding the causes of stranding gives us insight into marine mammal populations and health.

The Marine Mammal Center is engaged in a variety of research projects to learn more about marine mammal health. Current projects include studying herpes virus in Pacific harbor seals, researching the etiology of cancer in California sea lions, and discovering novel parasites in Northern elephant seals and other species. On-going clinical trials help improve veterinary treatment. Tagging studies allow us to compare behavior of rehabilitated animals with wild animals. Retrospective studies of past data allow comparison of trends in strandings. Collaboration with researchers from other institutions is also an important component of our program. In all these ways, responding to stranded marine mammals provides opportunities to learn about the animals and their environment.

Liz Ponzini – Golden Gate National Parks Conservancy
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Control of *Ageratina adenophora* in the Marin Headlands, Golden Gate National Recreation Area

Over the period of three years, funding was received by the Golden Gate National Recreation Area to reduce the amount of thoroughwart (*Ageratina adenophora*) within the Marin Headlands coastal corridor in order to improve the habitat of the federally endangered mission blue butterfly (*Plebejus icaroides missionensis.*) Thoroughwart is a perennial shrub native to Mexico, which has become widely naturalized in California. This invasive plant is generally found in moist or wet areas including creek beds and drainages, disturbed areas, or areas with steep slopes. Thoroughwart can vary in height from three to ten feet tall and has purplish branches that can root on contact with moist soil. It reproduces by creating an abundant amount of seed asexually, which is easily dispersed by wind.

A control strategy was created by prioritizing patches by watershed, based on the distance from the mission blue butterfly host plant patches, presence or absence of rare or threatened species or communities, the size of the thoroughwart patch, and the potential for thoroughwart patch expansion. The ultimate goal was to remove outlying populations and reduce all infestations totaling 45 acres when remapped in 1998 down to its 1987 level of 9.5 acres, the total acreage when it was originally mapped.

Various methods of removal were employed in order to reduce and remove the thoroughwart infestations with direct impact on and adjacent to butterfly habitat. Manual removal using hand picks and pulaskis was the main method of eradication in areas adjacent to populations of *Lupinus albifrons*, the host plant of the mission blue butterfly. Brushcutting was employed where populations were extremely dense and were then followed up by manual removal of the root, as re-sprouting would otherwise occur. A thick layer of mulch was applied to most removal sites in order to prevent seed from germinating. Herbicide was also used in extremely large sites where erosion was a concern and when they were a safe distance away from *lupinus albifrons* populations.

Removed plant material was composted on site, as off-site disposal would have been too costly and laborious. Native plant species replenished most sites voluntarily from an existing seed bank. These natives proved more successful in restoring an area where mulch was applied, as it suppressed other invasive plants, usually bull thistle and poison hemlock. The reduction of thoroughwart within the Marin Headlands was achieved through the efforts of volunteers, NPS and Parks Conservancy staff, Marin Conservation Corps, and outside contractors. The efforts to reduce this invasive plant proved successful, but future funding and long term follow-up efforts are required to achieve extinction within the mission blue butterfly habitat and all of the Marin Headlands.

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Developing Sanctuary Stewards through High School Sandy Beach Monitoring

US Geological Survey biologists are conducting research on wildlife in the Golden Gate National Recreation Area. Recent studies have included bird and mammal surveys, and coyote-focused carnivore research.

To understand the behavior and ecology of coyotes in the park and surrounding environs, biologists have been conducting scat surveys to compare the distribution and diets of coyotes with those of bobcats and gray foxes, and radio-tracking coyotes to examine home range sizes and other space utilization patterns.

In the Presidio, the USGS is conducting research on a variety of carnivores using camera traps, observations, and radio-tracking to understand wildlife in this unique area. At the symposium, a USGS booth will feature wildlife artifacts and research equipment for a "hands-on" view of field research.

Sue Abbott

Sue Abbott is conservation outreach coordinator and biologist with PRBO Conservation Science (formerly Point Reyes Bird Observatory). She has worked on a wide variety of PRBO projects, from elephant seals on the Farallon Islands to songbirds of the Central Valley. She teaches bird conservation and ecology in and out of the classroom (K–adult), and conducts educational outreach across California. Her previous work on the Point Reyes Snowy Plover Recovery Project sparked her ongoing interest in using education and outreach as tools to reduce human disturbance to bird populations, particularly the threatened western snowy plover. Sue is the Western Snowy Plover Outreach Coordinator for Monterey Bay and San Francisco Bay areas (Recovery Unit 4). She is also a member of PRBO's oil spill response team.

Ben Becker

Ben is currently the director of the Pacific Coast Science and Learning Center at Point Reyes National Seashore (National Park Service). His research generally focuses on one of two questions: 1) What are the relative effects of normal oceanographic variation versus anthropogenic pressure (fishing/global change) on marine food webs, and 2) What strategies do marine birds use to efficiently find prey on a highly patchy and variable marine landscape. As director of the Science and Learning Center, Ben also oversees and coordinates research by scientists and graduate students that helps us understand and protect marine and coastal ecosystems. Ben received a BA from UCLA, an MS from Yale, and a PhD from UC Berkeley.

John Callaway

John Callaway is an assistant professor of environmental science at the University of San Francisco. His research expertise is in wetland restoration, specifically, wetland plant ecology and sediment dynamics, with research projects in both San Francisco Bay and southern California.

Tom Elliott

Tom Elliott is restoration coordinator for the Parks Conservancy's Site Stewardship Program. He spends his time looking at native plants, fighting invasive weeds, and trying to improve habitat for rare and endangered species like the Mission Blue. Tom has worked in the GGNRA for 9 years, working throughout the park in habitat restoration and native plant propagation.

Sharon Farrell

Sharon Farrell is executive director of Aquatic Outreach Institute. For a decade prior to this, she worked for the National Park Service and Presidio Trust, developing and coordinating both community-based ecological stewardship programs and natural resource-based education programs. Sharon also oversaw habitat restoration and vegetation monitoring activities throughout the Golden Gate National Recreation Area as the park's plant ecologist. Sharon is a Switzer Fellow, and holds degrees in chemistry and recreation and park management, with an emphasis on evaluating the recreational and community values of natural resource-based stewardship programs.

Allen Fish

Director of the Golden Gate Raptor Observatory since its inception in 1985, Allen Fish has also led trips and taught classes for California Academy of Sciences. He is a senior lecturer in the Department of Avian Sciences, UC Davis, and has a peculiar affection for coyote brush, brook trout, fritillary butterflies, shrew-moles, Calochortus lilies, and mandolin music.

Darren Fong

Darren has worked as the GGNRA's aquatic ecologist since 1994. Prior to this, he worked as a biologist for the U.S. Fish and Wildlife on wetland issues and a biological technician with the U.S. Forest Service on water-related issues. Darren received his MS from UC Berkeley in wildland resource science.

Kerri Frangioso

Kerri Frangioso is assistant conservationist with the Wildlife Conservation Society's North America Program. In this position, she works to quantify the effects of Sudden Oak Death (SOD) on wildlife communities in California and to establish methodology for quantifying acorn production in an area that is known to be infected and comparing it to an area that is free from the pathogen. Along with others in the project, she is working with private and public landowners in the Big Sur region to educate people about SOD and to find ways to mitigate the many problems associated with this disease. Kerri has a BA from Assumption College in Worchester, MA, and worked as a field technician for WCS since 2000.

Tom Gardali

Thomas Gardali grew up in California's Great Central Valley. He earned an undergraduate degree in environmental studies from the UC Santa Cruz in 1992 and has been an ecologist for the Terrestrial Ecology Division of PRBO Conservation Science since 1993. His research interests are conservation-oriented and range from natural history and restoration ecology to the effects of habitat succession and climate patterns on birds.

Summer Lindzey

Summer splits her time between monitoring the mission blue butterfly for Site Stewardship and pursuing an academic career at San Francisco State University. She has spent the last three years working on various field projects in the Bay Area and taking coursework required for graduate study in conservation biology. Her recent work at Oakwood Valley has sparked a heretofore unknown enthusiasm for butterflies and entomology, which she hopes to build on in graduate school at SF State. She hopes to apply her training to solving the mystery of the blue butterflies at Oakwood Valley..

Mia Monroe

Mia Monroe has been observing and monitoring monarch butterflies in California and Mexico for 15 years. She serves as coordinator of the Xerces Society's California Monarch Campaign. Mia is the National Park Service Interpretive Supervisor for GGNRA's Marin parklands and has been a ranger at Muir Woods for 20 years.

Elizabeth Ponzini

Liz has been working in Natural Resources in the park for 6 years, first as an AmeriCorps member, then as an intern with the Native Plant Nursery program, and now as Tennessee Valley nursery manager and project manager for the Thoroughwort Control Program.

Jan Roletto

Jan Roletto is the research coordinator and sanctuary biologist for the Gulf of the Farallones National Marine Sanctuary, Cordell Bank National Marine Sanctuary, and the northern portion of the Monterey Bay National Marine Sanctuary. Jan's responsibilities at the sanctuaries include research design, development, and implementation of the five-year research and management plans. One of Jan's primary responsibilities includes developing and implementing the monitoring and recovery of specific sanctuary resources following damage from natural or human causes. This duty is, in part, accomplished through the Beach Watch and SEALS programs, volunteer-based monitoring programs for the sanctuaries.

Jan also works with the Office of General Counsel for the Southwest Region and NOAA's Damage Assessment Division in the assessment of damage to sanctuary resources caused by vessels or other regulated activities. She assembles existing information pertaining to the sanctuaries and develops and maintains a comprehensive annotated bibliography database and description of sanctuary ecosystems. Each of the projects that Jan has developed meets the research, educational, recreational, and resource protection objectives of the sanctuaries.

Jan's administrative duties at the sanctuaries include reviewing permit applications and EIR/S for work in the sanctuaries and the potential impact a project may have on sanctuary resources. Jan also works with state and other federal resource trustee agencies in developing and implementing environmental disaster and mortality event response plans.

In order to promote the sanctuaries as research labs, Jan assists researchers in the design and conduct of scientific studies in the sanctuaries, recommending appropriate methodologies to conform with the protected nature of the site, aiding in the selection of study sites, providing logistical assistance and orientation to researchers on an as-available basis, and promoting marine research through educational opportunities and workshop forums.

Jan's primary research interests are the morbidity and mortality in marine mammals and seabirds, documentation and water quality of the intertidal and wetland habitats within the sanctuaries, and restoration and protection of sanctuary resources.

Jennifer Saltzman

Jennifer Saltzman is education coordinator for the Farallones Marine Sanctuary Association. She develops and implements student monitoring programs for high school students, including teacher training workshops. Before joining the association, Jennifer coordinated education programs for adults and families at two science museums in Chicago and taught oceanography at several colleges, including the U.S. Naval Academy. She earned a PhD in biological oceanography at the University of Rhode Island, and a BS in oceanography at the University of Michigan.

Jennifer Shulzitski

Jennifer Shulzitski, ecologist, Golden Gate Field Station, USGS Western Ecological Research Center, holds an MS and BS in biology and is a member of the Wildlife Society (2003), the Natural Areas Association (2002), the Raptor Research Foundation (2001), and the Animal Behavior Society (1999). Her research interests include effects of fragmentation and anthropogenic effects at urban-wildland interfaces, long-term monitoring of terrestrial vertebrate populations, behavioral ecology of migratory passerines and raptors, and education and outreach between the public and the scientific community.

Kathryn Zagzebski

Kathryn Zagzebski has worked as manager of the Stranding Department at The Marine Mammal Center since 1998. Prior to this, she volunteered with the stranding network on the east coast and with various dolphin research groups. She has a master's degree from Duke University. She is a member of the Society of Marine Mammology, and serves on the board of the American Cetacean Society.


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